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Factors Impeding Credit Use in Small-Farm Households in Bolivia

by

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Introduction

Agricultural credit is considered an important instrument in helping small farmers to increase their income and numerous programs have been established to increase the volume of agricultural credit for this purpose in low-income countries. Yet, despite these efforts, few small farmers are integrated into these formal market credit programs, and do not use credit or, if they do, they continue to borrow from informal credit market lenders (Adams). Reasons commonly offered are: (a) farmers have sufficient liquidity given their planned expenditures; (b) after taking account of available technology and risk, farmers do not judge the expected returns high enough to warrant borrowing; (c) farmers lack information about the availability of credit and find the cost of obtaining that information is too high; and (d) farmers are discouraged from borrowing because of high transactions costs involved in obtaining a loan. (Baker, Bhatt, Lipton, Schultz). The latter helps explain why small farmers prefer to deal with informal market lenders whose simple and low-cost credit delivery systems more than offset higher interest costs (Donald).

In order to try to increase credit use most empirical research and policy measures have focused on demand related factors that would increase the productivity of credit and raise farm incomes. It is only recently that increasing attention has been directed at factors on the supply side, especially the transactions costs of credit use, as serious deterants to borrowing (Adams and Nehman) with the call for cost-reducing policy

innovations in agricultural lending (Adams and Ladman). The objective of the present study is to identify both supply and demand factors that affect borrowing by farm households. Survey data from a large sample of small farmers in traditional farming areas in the mountain valley regions of southern Bolivia provide the basis to empirically examine the roles of these factors. In the following, a conceptual framework of farmer demand and supply of credit is presented, and hypothesized factors that would limit farmer use of credit are identified. Then, descriminate and tabular analyses are applied to a sample of Bolivian small farmers to determine if there are differences between users, potential users and non-potential users of credit as well as between formal and informal market borrowers with respect to the hypothesized inhibiting factors.

Conceptual Framework

An excess-demand-for-funds model is used to explain the quantity of credit demanded by a farm household, where the farmer uses funds to satisfy both production and consumption requirements. In this model the farmer's demand for credit is the residual or excess demand of the farm household's demand for funds over the supply of internal funds that are available in the household.

(Insert Figure 1 here)

As shown in Figure 1, the marginal value product (MVP) schedule is the farm-household's demand for funds, and reflects diminishing marginal utility for funds. The demand for borrowed funds is the portion of the schedule to the right of the supply of internal funds (S). The costs of credit are represented by the average (AC) and marginal (MC) cost schedules. Fixed transactions costs, such as filling out forms, obtaining necessary documents, paying

required fees, trips to lender's office, etc. mean that the AC of the initial units of credit are relatively high, but decline rapidly as more funds are borrowed.

MC is comprised of three elements: interest rate (i), marginal transactions costs (MTC), and marginal risk costs (R). Although a lender usually charges a fixed rate of interest, when the borrower is forced to seek out additional sources of credit both i and MTC rise. Moreover, as more is borrowed, the farmer faces increasing R not only from the possible losses of his equity as he expands his leverage but also as he diminshes his credit reserve.

A farm household will not want to borrow if the expected AC are greater than expected average returns. Q_A is the borrowing threshold and the farmer would be willing to borrow up to Q_B where MC equals MVP. Thus, $Q_S Q_B$ funds would be borrowed and 0 Q_S would be supplied from the farmer's internal funds.

The components of the model - the demand schedule for funds, the supply of internal funds and the borrowing and risk costs - are each affected by the particular characteristics of a given farm household. Characteristics associated with the demand schedule for funds are educational level and management ability of the farmer, use of improved technology, type of farm enterprise, location of farm, and level of market integration. The supply of internal funds is affected primarily by the asset level of the household. For a given demand schedule for funds, a higher asset level allows for a larger supply of equity funds. This supply is expected to increase with the farmer's age since assets are typically accumulated over time.

The credit supply schedule faced by the farm-household is determined by borrowing costs that are a function of interest, transactions and risk costs. The farmer's previous borrowing experience, educational level and language (in cases where native tongue is not the language in which credit and marketing

transactions normally are undertaken) and aversion to risk affect these costs. Additional factors include the paperwork and time involved in obtaining a loan, loan size, asset level, credit use, expected income and probabilities of crop failure and unfavorable market prices.

The particular household characteristics associated with each of the components of the excess demand for funds model jointly determine the quantity of credit demanded. Characteristics associated with a higher demand schedule for funds, a lower equity funds supply and lower borrowing costs each contribute toward raising the quantity of credit demanded by a farm household.

Study Area and Data Base

The data used in this study were obtained from a sample of 699 small-farm households interviewed in the Bolivian Agricultural Sector II Loan Survey conducted in April and May 1977 and located in the three Southwestern Bolivian departments (states) of Chuquisaca, Potosi and Tarija. Data were obtained on many characteristics of farm households, including resource use, production, income and marketing as well as details on use of credit or, in the case of non-users, the reasons for non-use.

The sample region encompassed a low-income agricultural sector comprised almost entirely of small farmers, many of whom utilized traditional production practices. For the agricultural year studied, the mean farm size was found to be four hectares per household. Mean household income of the region was only 6,500 pesos (325 U.S. dollars). In addition, 25 percent of that income was derived from non-cash sources such as consumption of goods produced on the farm. Also, off-farm income accounted for 40 percent of the net household income.

The educational level of the sample households was uniformly low in the region. Only 15 percent of the heads of the households had over three years of formal education. Nearly half of the households used the Incan language of

Quechua, rather than Spanish as their principal language, a majority of whom live in the department of Potosi.

It was found that most of the households do not borrow. Only 6.7 percent of the households had used agricultural credit during the agricultural year; 3.4 and 3.3 percent used credit from formal and informal sources respectively. In spite of the low percentage using credit, 87 percent indicated that they would like to borrow from formal sources during the next agricultural year.

The farm households were separated into three groups according to borrowing status: (a) borrowers who presently use credit; (b) non-potential borrowers, those who do not want to use credit during the next agricultural year; and (c) potential borrowers, those who want to use credit during the next agricultural year.

Hypotheses

Three hypotheses were tested. First, physical and psychological conditions associated with farm households are important as differentiating factors between borrowers, potential borrowers and non-potential borrowers.

Second, farm households that use formal credit sources in comparison with those that use informal credit sources have: higher levels of fixed assets, higher levels of income, higher levels of education and literacy, more proficiency in the Spanish language, closer proximity to financial institutions, different uses of credit and borrowed larger amounts of credit. Third, potential borrowers are impeded from borrowing by the implicit costs of credit, including risk and the perceived transactions costs of loan application procedures, paperwork and distance to market.

Multiple discriminate analysis was used to test the first hypothesis. Tabular analysis was used to test the second and third hypotheses.

Predetermined characteristics that would influence credit use, as determined by the conceptual framework, were utilized. These included data on the

farming operations and qualitative responses by the sampled farm households on their reasons for using credit or not. Proxy measures were employed as necessary. Twenty-two differentiating factors were examined; operational definitions for all variables used follow.

Definition of Variables

Education is the level of formal education obtained by the head of the household. The levels used are:

1 = no education

2 = 1-3 years

3 = 4-12 years

4 = more than 12 years education.

Literacy is equal to 1 if the household head is literate, and 0 if not literate.

Language is equal to 1 if the principal language spoken in the household is Spanish, and 0 if Quechua.

Age is the age of the household head in years.

Distance is a measure of the travel time from the farm to the usual market place. The distance levels are:

1 = less than 1 hour

2 = 1-3 hours

3 = 3-6 hours

4 = 6 or more hours.

Land is the usable land assets of the farm household measured in hectares, where usable land is the total land size, excluding land that cannot be planted, grazed or productively used.

Land Title is equal to 1 if the household has a legal government-issued title to its land, and 0 otherwise.

Net Farm Income (NFL) is all net cash income from the farm plus imputed values for non-cash income earned from the farm.

Off-Farm Income (OFI) is all income earned by all household members from non-farm sources.

Net Household Income (NHI) is NFI + OFI.

Cattle is the number of head of cattle owned by the household.

Percent Corn is the ratio of the value of corn sales to the total value of farm cash receipts of the household, expressed as a percentage.

Percent Potato is the ratio of the value of potato sales to the total value of farm cash receipts of the household, expressed as a percentage.

Market Intergration is the ratio of the farm cash receipts to the gross farm income of the household expressed as a percentage. Gross farm income includes an imputed value of the farm output consumed by the farm household.

Operating Expenses are the total agricultural expenses. Included are production expenses, livestock expenses other than livestock purchases, wages paid, rents paid, maintenance expenses and other agricultural expenses.

Investment Expenses are those expenses for purchasing livestock, tools and machinery, and capital improvements, such as wells, irrigation and construction.

Improved Technology equals 1 if the household bought fertilizer or agricultural chemicals or used improved varieties of seeds or plants during the past crop year, and 0 otherwise.

Loan Size is the present size of the outstanding loan at the time of the interview.

Production Goals equals 1 if the household produces at its present level because "it does not need or want to produce more" and 0 otherwise.

Production Limitations is a set of dummy variables measuring the household's stated impediments to producing more. The limitation variables are:

Price Security = 1 if product prices and price security are stated impediments, 0 otherwise,

Markets and Services = 1 if accessibility to markets and services at reasonable prices is an impediment, 0 if otherwise,

Need for more Workers = 1 if lack of labor is an impediment, 0 otherwise,

Need for more Land = 1 if insufficient land is a stated impediment, 0 otherwise.

Paperwork is equal to 1 if paperwork is a stated impediment to the use of credit by the household, and 0 otherwise. It specifically includes the lack of understanding of paperwork, too much paperwork and legal papers not being in order.

Fear of Refusal equals 1 if fear of refusal by the lenders was a stated reason for not using credit, and 0 otherwise.

Fear of Repayment equals 1 if fear of repayment ability from yield or price decline are stated impediments of using credit, and 0 otherwise.

Empirical Results

Differences Between Groups

The univariate F-values presented in Table 1 indicate that significant differences exist among the group means for eighteen of the twenty-two variables hypothesized to affect the behavior of borrowers, non-borrowers and potential borrowers. In particular, production goals, investment expenses, language, price security and operating expenses, market integration and improved technology have extremely high F-values. The land, net farm income, percent corn and need for more land variables are not statistically significant because of large standard deviations from the mean within each group.

(Insert Table 1 here)

The univariate F-values indicate the potential power of each individual

variable in discriminating among groups. The relative importance of each characteristic is determined with discriminate functions when all variables are entered simultaneously into the discriminant analysis. Two discriminant functions are produced in Table 2.[1] The standardized discriminant function coefficients show the relative contribution of each associated variable to each of the functions. That the two functions have $\chi 2$ values that are statistically significant at the 0.001 level, with 38 and 18 degrees of freedom respectively, confirms that there are distinct differences in farm-household characteristics among the groups of non-potential borrowers, potential borrowers and present borrowers.

The power of discrimination in the function variables is 31 percent in Function 1 and 17 percent in Function 2, for a total of 48 percent explained variation among the credit groups.[2] Eigenvalues show that the two functions account for 68 and 32 percent of the model's discriminating power respectively. Using the discriminant functions to classify each sample household into the most likely borrower group according to the set of characteristics associated with that household, the discriminant functions correctly classified 78 percent of all the sample households.[3]

As denoted by the location of group centroids, Function 1 primarily distinguishes the non-potential borrower group from the other groups. This is shown by the relatively large size (-1.584) of the group centroid in relation to the other group centroids, which are 0.221 for potential and -0.282 for the present borrowers.

(Insert Table 2 here)

In Function 1 production goals (coefficient of -0.816) contributes 33 percent of the total discrimmatory powers and an additional 31 percent is provided by the need for more workers (-0.282), price security (-0.244) and

language (-0.227). Other factors contribute considerably less and, consequently, are much less important in differentiating groups. The negative signs of the leading variables indicate that these factors contribute to the non-potential use of credit whereas a positive sign would indicate a contribution to potential credit use.

Discriminant Function 2 most readily distinguishes present borrowers from the other groups. The leading variables are investment expenses (-0.519), price security (-0.378), operating expenses (-0.284), cattle (-0.244), improved technology (-0.237), land (-0.226) and market integration (-0.159). These coefficients confirm that borrowers have considerably higher levels of market activity than nonborrowing.

The coefficients of the two functions have the expected signs for all variables with the exceptions of distance, land and net household income. It would be expected that in Function 2 the distance coefficient would have a positive sign, i.e. households not wanting credit would live farthest from the marketplaces due to high costs of obtaining information and transactions. However, the result is plausible because off-farm income constitutes the majority of the net income for households closer to the market and, therefore these farmers are relatively less dependent on farming as a livelihood. As shown in Table 1, land and net household income have the expected relative mean differences among the borrower groups, but the signs on the function coefficients are not consistent--probably due to the large variation that exists for these variables as evidenced by their low univariate F-values.

The results demonstrate that there are distinct differences in farm-household characteristics among groups of non-potential borrowers, potential borrowers and present borrowers. The major characteristics distinguishing non-potential borrowers from other farm households are that they are less eager to expand production and have a more frequent production constraint due

to lack of workers than the borrowers and potential borrowers. Non-potential borrowers are also older, less well educated, use less improved technology and live closer to marketplaces than the other groups.

Potential borrowers constitute the majority of the sample households. The results show that this group of households are distinguished by being much more apt to speak Quechua, living farther from the marketplaces, having fewer cattle, and by being much less hindered in production by concern for price security than the other households. Borrowers are most distinguished by having very high investment and operating expenses, a concern for price security, more cattle, a high use of technology, more market integration, and higher levels of education in comparison to other groups.

Formal and Informal Market Borrowers

Tabular analysis was used to determine if there were differences in selected characteristics between farmers borrowing in formal and informal credit markets. The results are presented in Table 3.

(Insert Table 3)

It is clear that formal market borrowers, in comparison to informal market borrowers, live closer to the market centers, have higher levels of farm income, obtain larger loans and use credit more often for fertilizer, chemicals and seed. There is no significant difference in their level of education, household language, cultivable land, nor off-farm income.

Implicit Costs of Credit

In answer to the multiple response question of which factors inhibited their use of credit the sampled farmers had three predominent responses; 80 percent identified "excessive paperwork", 37 percent stated that they feared they would not be able to repay the loan, and 20 percent stated they they feared they would be refused the loan. Actual refusal from lending institutions

was not a major impediment since only six percent of the households had previously sought funds from formal lenders. In terms of the conceptual framework, relative to expected returns, the first response implies excessive transactions costs and the second excessive risk costs. The third response is suggestive of losing face and/or losing the sunk fixed transactions costs involved in obtaining a loan.

Tabular analysis was employed to compare each of the household characteristics of those households that had responded with any of the three factors with those households that did not indicate that response. Table 4 presents the significant summary statistics of a breakdown of these major credit use impediments.

(Insert Table 4)

The households impeded by paperwork are shown to be younger, less educated, more likely to speak Quechua, live farther from the market, and have less land and income. Households impeded by fear of inability to repay loans have less education, less land and live farther from the market. Those impeded by fear of loan refusal have less land, live farther from the market and are more likely to speak Quechua.

Conclusions

Even though few small-farm households in Southern Bolivia were using credit, most wanted to use credit from formal market institutions. This suggests that there are both demand factors, influencing the expected productivity of credit, and/or supply factors, influencing the availability and cost of credit, that impede their use of credit. Tests of hypotheses that there are differences between borrowers, potential borrowers and non-potential borrowers; differences between formal and informal market borrowers; and that implicit costs discourage borrowing; identify the importance of these factors and provide

insight for policy makers designing small-farmer credit programs not only in Bolivia, but also in other countries.

As expected, borrowers tended to use higher levels of technology, and have more ambitious production goals, higher levels of investment, higher operating expenses, higher household incomes, more cattle, more education, and greater market integration than non-borrowers. Undoubtedly, some of these characteristics are the result of using credit, but they also indicate that these farmers were able to perceive the benefits of credit as exceeding the costs of credit, perhaps due to their higher level of education and market intergration.

Borrowers in the formal market tend to live closer to the market, have higher net farm and household incomes, obtain larger loans and use credit for technologically improved inputs than informal market borrowers. There is no significant difference in their level of education, household language, usable land size, nor off-farm income.

These results suggest that formal market borrowers use higher levels of technology that require larger loans and lead to higher incomes. Thus, they exceed the formal borrowing threshold where returns cover average costs of credit even though the initial borrowing costs are likely to be much higher than in the informal market. Their closer proximity to market centers suggests that they experience lower transactions costs for travel and time spent in route and have lower costs in obtaining information about formal market lenders. The non-significance of education, language, off-farm income and useable land size rule out these characteristics as differentiating characteristics and further demostrate that the perceived costs and expected benefits from the use of credit are major factors that cause the borrower to use formal or informal market sources. The lower income households who lived farther from market and demanded

smaller quantities of credit had perceived less costs involved with obtaining funds from informal lenders due to the lower initial transaction costs.

Non-potential borrowers were distinguished by their lack of production goals, their greater age, lower levels of education, use of lower levels of technology and shortage of labor compared to borrowers and potential borrowers. These factors suggest that they do not perceive the benefits of credit to exceed the costs of same. They also tended to live more proximate to the market than potential borrowers. This may explain their higher off-farm incomes than the potential borrowers who tended to live more distant from the market. Potential borrowers, who comprised a large proportion of the sample, were likely to speak Quechua as their principal language, also perhaps a function of distance from markets, but this did not inhibit them from wanting to borrow as evidenced by their ambitious production goals and relative less hinderence by price insecurity than other groups. Labor was not a production impediment which implies that many households are not presently able to fully utilize their labor force.

These results suggest that farmers who want credit are not principally impeded by factors on the demand side, indeed they perceive the linkages between credit, acess to technology and improved incomes. Rather it is the farm households' supply factors that limit their credit. Clearly distance from market not only tends to limit the availability of credit, especially from formal market institutions, because of the increased lender costs in servicing more-distant farmers, but also raises borrower transactions costs. The fact that a large majority of farmers indicated that the excessive paper-work was a principal factor impeding the use of credit from formal market sources suggests that farmers perceive these transactions costs to be excessive to warrant borrowing. It is significant that this response was highly associated

with younger, less-well educated Quechua-speaking farmers, who live distant from the market and have less land and income. Clearly, the formal credit system does not cope with such households.

In conclusion, this study supports with empirical evidence what has become increasingly recognized that efforts to reach small farmers with formal market credit programs need to concentrate not only on factors that increase the productivity of credit, which has been the traditional approach through extension, marketing and infrastructural development programs, but also on innovations to reduce the costs of credit delivery for farmer and lender alike. Once farmers borrow, it is expected they will tend to undertake more investment, use higher levels of technology and raise incomes.

The supply side of a dual approach to agricultural credit program development should emphasize, in accordance with the results of this study, two interrelated features to reduce the cost and availability of credit. First, farmers distant from the marketplace must be reached. Second, the transactions costs of borrowing must be significantly lowered. The first might be accomplished by increasing the availability of financial services in the rural areas. Examples are mobile banks, local savings and loan cooperatives, branch offices and new credit institutions. It would also require increased credit educational and promotional efforts in these areas. The second could be accomplished by means of simplified application procedures, group loans, cooperative loans and other cost-reducing innovations. In addition, lenders who understand the local language and culture are essential to make the financial services available to all households.

It is clear that if the gap between the Bolivian small farmers who have credit and who want credit is to be closed, then closer attention must be directed to factors that reduce credit costs and increase the accessibility

of credit. This approach alongside with efforts to enhance the productivity of inputs employed with credit would enhance small-farmer borrowing utility and work towards development objectives in that country. Even though these results are country specific they are suggestive for policies in other countries.

ENDNOTES

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[1]Only nineteen variables were used in the discriminate functions because three variables - literacy, off-farm income and net farm income - showed high degrees of multicollinarity with other variables.

[2]The proportion of explained variation is obtained by squaring the canonical correlation value of the discriminant function.

[3]The classification procedure was carried out using equal group priors. Classification of the same observations used to estimate the function may upward bias the proportion correctly classified.

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Figure 1 Excess Demand for Funds

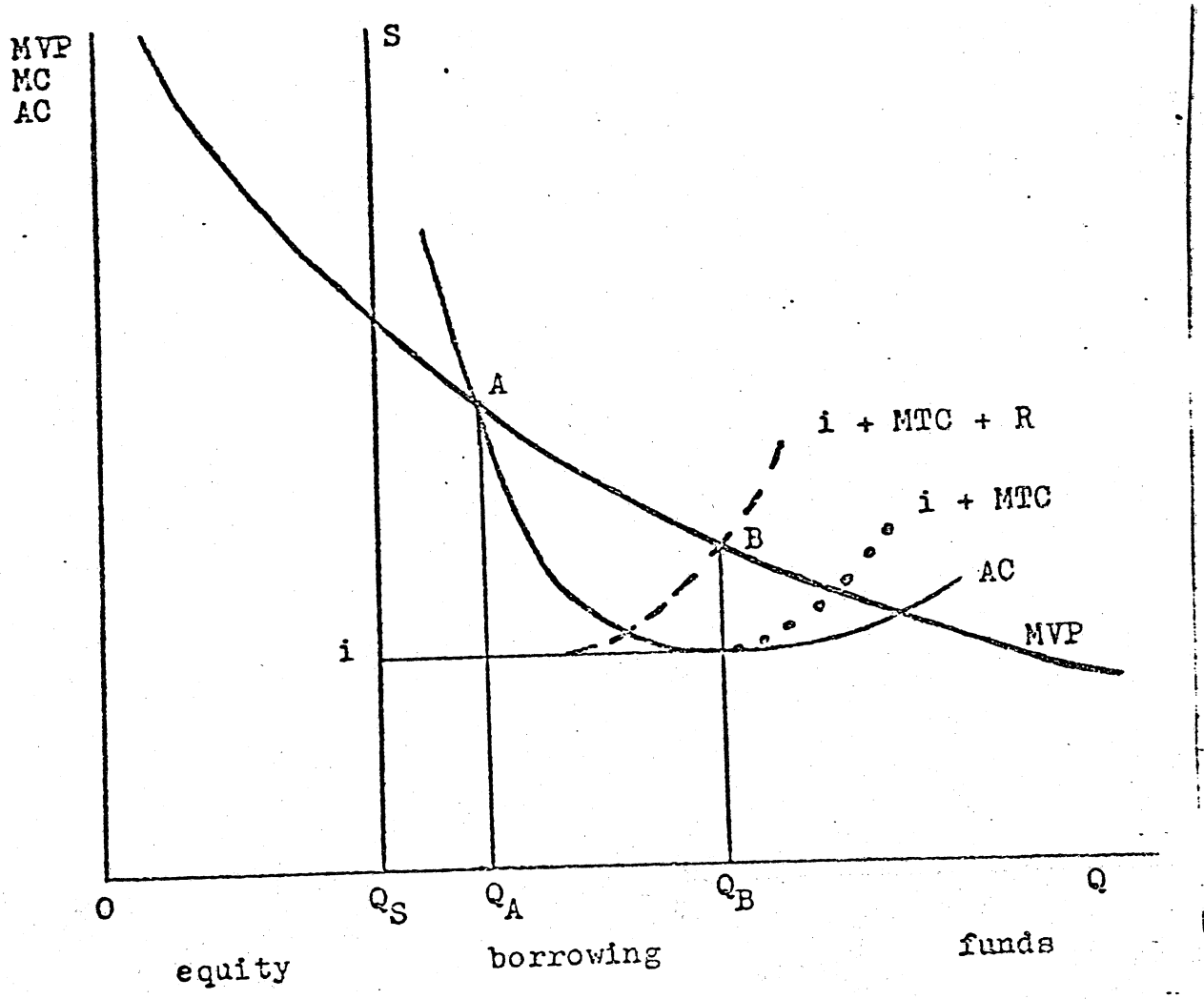

TABLE 1: Group Means of Differentiating Characteristics Between Non-Potential Borrowers, Potential Borrowers and Present Borrowers, and Associated Univariate F-values

Household Characteristics[a]	Non-potential	Potential	Borrowers	Univariate F-values[b]
Education	1.52	1.69	2.18	7.10***
Literacy	0.44	0.51	0.79	6.48***
Language	0.79	0.46	0.84	22.03***
Age	51.41	45.38	45.26	4.75***
Distance	2.20	2.77	2.42	7.17***
Land	2.64	3.60	6.54	1.05
Land Title	0.36	0.58	0.47	6.05***
Off-farm Income[c] (pesos)	4485.20	3180.46	8049.47	5.93***
Net Farm Income[c] (pesos)	1883.79	3050.50	4377.05	0.69
Net Household Income (pesos)	6368.98	6230.96	12426.52	3.54**
Cattle	4.26	3.16	6.89	8.59***
Percent Corn	5.82	4.65	8.74	1.16
Percent Potatoes	2.00	8.89	2.86	3.14**
Mkt. Integration	32.46	33.41	61.34	13.56***
Operating Exp.[c] (pesos)	1761.48	1459.31	16142.71	16.63***
Invest Exp.[c] (pesos)	183.85	574.81	3664.74	25.16***
Improved Tech.	0.23	0.32	0.66	11.15***
Production Goals	0.26	0.00	0.03	71.07***
Price Security	0.21	0.08	0.34	17.18***
Mkts. and Services	0.36	0.58	0.58	5.26***

TABLE 1: Continued

Household Characteristics[a]	Non-potential	Potential	Borrowers	Univariate F-values[b]
Need for More Workers	0.21	0.06	0.05	10.49***
Need for More Land	0.41	0.46	0.37	0.89
No. of Observations	(70)	(569)	(47)	-

[a] See list of variables for definitions and units of measurements.

[b] Superscripts denote significance level of 1% (***), 5% (**) and 10% (*), (2 and 581 DF).

[c] The exchange value of the Bolivian Peso during the period of the study was $b20.00 = $1.00 U.S.).

TABLE 2: Discriminant Analysis of Borrower Groups

Household Characteristics	Standardized Discriminant Function Coefficients	
	Function I	Function II
Education	0.070	-0.085
Language	-0.227	-0.065
Age	-0.098	0.104
Distance	0.118	-0.114
Land	0.043	0.226
Land Title	0.063	0.025
Net Household Income	0.036	0.032
Cattle	-0.119	-0.244
Percent Corn	-0.010	-0.021
Percent Potatoes	0.078	0.025
Mkt. Integration	-0.012	-0.159
Operating Exp.	-0.006	-0.284
Invest. Exp.	-0.017	-0.519
Improved Tech.	0.107	-0.237
Production Goals	-0.816	0.079
Price Security	-0.244	-0.378
Mkts. and Services	-0.006	-0.100
Need for More Workers	-0.282	0.145
Need for More Land	-0.090	0.022

Table 2: (Continued)

Household Characteristics	Standardized Discriminant Function Coefficients	
	Function I	Function II
Group Centroids		
Non-potential Borrowers	-1.584	0.271
Potential Borrowers	0.221	0.088
Borrowers	-0.282	-1.561
Eigenvalue	0.446	0.209
Relative Percentage	68.06	31.94
Canonical Correlation	0.555	0.416
Wilk's Lambda	0.572	0.827
χ^2	319.68[a]	108.71[b]

[a] χ^2 is significant at 0.001 level (38 DF)

[b] χ^2 is significant at 0.001 level (18 DF)

Table 3: Differences Between Formal and Informal Credit Market Borrowers

Formal Market Borrowers Have:	χ^2
Higher Levels of	
Net household income	15.63***
Net farm income	10.17***
Off-farm income	3.64
More cultivable land	3.57
Education	3.27
Closer proximity to market centers	18.26***
Different uses of credit for:	
Seed	4.40**
Fertilizers or chemicals	8.12***
Tools or machinery	3.13*
Larger loans	17.54****
More proficiency in Spanish (rather than Quechua)	0.36

Superscripts denote significance level of 1% (***), 5% (**), and 10% (*).

TABLE 4: Association of Credit Use Impediments with Farm-Household Characteristics

	X^2
Stated Paperwork as Impediment	
Age	4.68*
Education	12.24***
Language	93.80***
Distance from Market	50.83***
Useable land size	17.70***
Net Household Income	23.03***
Stated Fear of Repayment as Impediment	
Education	10.24***
Distance from Market	28.74***
Useable Land Size	18.76***
Stated Fear of Refusal as Impediment	
Language	42.92***
Distance from Market	19.03***
Useable Land Size	10.30***

Superscripts denote significance level of 1%(***), 5%(**), and 10%(*).